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# Upper Elkhorn

## Natural Resources District

**Annual Report for the Lower Platte River Basin Coalition  
Basinwide Water Management Plan**

**Reporting Dates: 01/01/2020 – 12/31/2020**

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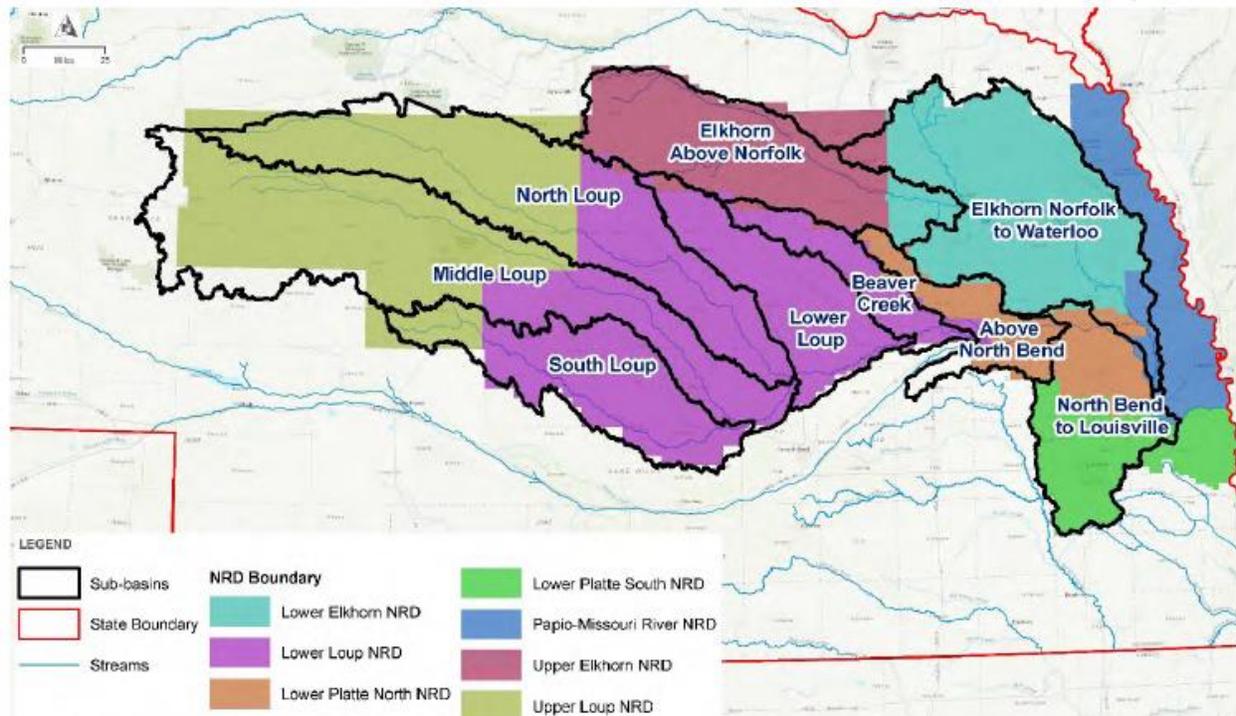
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## **INTRODUCTION**

This report was prepared to review activities within the Upper Elkhorn Natural Resources District (UENRD or District) in accordance with the Lower Platte River Basin Coalition Basinwide Water Management Plan. This is the 4<sup>th</sup> report compiled by UENRD and covers the dates January 1, 2020 to December 31, 2020. This report covers only activities within the Lower Platte River Basin (thick black line) of UENRD (in pink), see map below; thus eliminating part of Northern Antelope County and other sections outside the Lower Platte River Basin (LPRB).



*Figure 1: Boundary of the Lower Platte River Basin. From the Lower Platte River Basin Coalition Basinwide Water Management Plan, 2017.*

## **CERTIFIED IRRIGATED ACRES**

The UENRD is in the process of Groundwater Irrigated Acre Certification. Acre certification initially was based off of 2010 County Assessor data. Landowners who paid irrigated tax during 2010 received a certification letter for each parcel listed as irrigated. Once the landowner received their letter, they needed to compile documentation showing the amount of irrigated acres for that legal. Documentation could either be in the form of a FSA form 578 or county assessor tax records. Since UENRD started the process the landowner has been updated with new County Assessor data.

Due to the 3 different designated areas within the Upper Elkhorn NRD, landowners were instructed in their certification letter as to which years their documentation should include. Landowners with

groundwater irrigated acres that have been irrigated at least once within the Lower Niobrara River Basin fully appropriated designation during the calendar years of 2003 through October 16, 2007; the Lower Platte River Basin designation between the calendar years of 2004 and December 16, 2008; and the previously undesignated area of Holt and Northern Antelope Counties between the years of 2008 through October 1, 2012 will be certified at 100% with proper documentation.

Historically groundwater irrigated acres currently enrolled in the Conservation Reserve Program, Conservation Reserve Enhancement Program, Environmental Quality Incentive Program or other federal, state, or local conservation program or irrigated prior to the basin designations must also be certified in order to irrigate in the future. Acres that were historically irrigated in the Lower Niobrara River Basin prior to 2003, Lower Platte River Basin prior to 2004, and previously undesignated areas of Holt and Northern Antelope Counties prior to 2008 and have proper documentation may receive 95% certification for the total amount of irrigated acres (see “WATER BANKING ACTIVITIES” on Page 7), should the landowner decide to reactivate a field for irrigation purposes. Any irrigated acres that are not certified prior to the certification deadline will not be allowed to have groundwater applied to them for any purpose.

- **Current Certified Groundwater Irrigated Acres:** 479,757.8 acres (as of 01/28/2021)
- **Total Certified Groundwater Irrigated Acres:** Unknown until the certification is complete, but estimated at roughly 500,000 acres.

## **MUNICIPAL AND INDUSTRIAL/LIVESTOCK USES**

### **1) Municipal Use**

UENRD contacted municipalities within the LPRB of the District for annual pumping data. Municipal baseline data and pumping rates had not previously been recorded by the District, as such, not all municipality data is available in this report. **Appendix A** has 01/01/2020 – 12/31/2020 gallons pumped, per capita use, population served, baseline pumping rates, and number of wells per municipality (Atkinson, Bassett, Chambers, Clearwater, Elgin, Ewing, Neligh, Newport, Oakdale, O'Neill, Page, and Stuart.)

### **2) Industrial/Livestock Use**

UENRD does not track water usage of industries or livestock operators within the District. **Appendix B** shows all registered wells which have the capacity to pump  $\geq 50$  gallons per minute (GPM) for commercial/industrial (C) and livestock (S) uses.

**NEW CONSUMPTIVE USES****Expansion of Groundwater Irrigated Acres**

UENRD opened up groundwater irrigated acre expansion for the 2021 growing season, held in the fall of 2020. For the 2021 expansion, 11 applications were approved totaling 590.43 acres within the LPRB, an estimated groundwater depletion of 50.41 acre-feet. See **Appendix C**.

The depletion estimate in acre-feet (AF) was estimated using the following formula:

$$\text{Depletion Estimate} = \text{Number of Acres} * \text{NIR} * \text{SDF} * \% \text{ Depletion}$$

Where:

NIR = net irrigation requirement in feet, based on the Department of Natural Resources' INSIGHT data for corn irrigation requirements

SDF = stream depletion factor percent, based on the Department of Natural Resources' CENEB stream depletion values for the Loup River and upper portions of the Elkhorn River Basins

% Depletion = 0.30 (30 %) for all groundwater irrigated farmland

**RETIREMENT OF CONSUMPTIVE USES**

UENRD did not retire any consumptive groundwater uses between 01/01/2020 and 12/31/2020.

**TRANSFERS**

UENRD approved 2 transfers in the Lower Platte River Basin between 01/01/2020 and 12/31/2020, totaling 114.00 acres, all irrigated farmland. The depletion estimate in acre-feet (AF) was estimated using the Depletion Estimate Formula above (see "NEW CONSUMPTIVE USES"). The change in depletion was calculated by subtracting the depletion estimate of the "FROM" location from the "TO" location. Overall, UENRD increased our depletion of groundwater by 2.87 acre-feet.

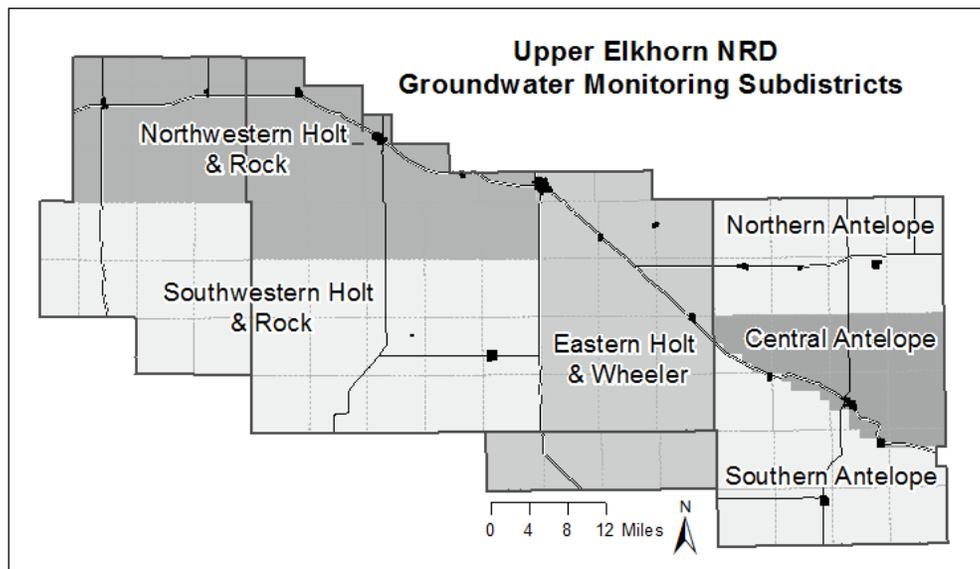
	Number of Acres	Transfer FROM	FROM Depletion Estimate (AF)	Transfer TO	TO Depletion Estimate (AF)	Change in Depletion
	57	E1/2 NE 12-27-12	14.17	NW 20-28-11	15.61	1.44
	57	N1/2 SE 12-27-12	14.17	NW 20-28-11	15.61	1.44
<b>TOTAL</b>	<b>114</b>					<b>2.87</b>
<b>The transfers highlighted in yellow involved acres either coming into or moving out of the LPRB.</b>						

**WELL CONSTRUCTION PERMITS**

UENRD issued 14 well construction permits for groundwater wells within the LPRB between 01/01/2020 and 12/31/2020. See **Appendix D**. UENRD requires a permit for all new, helper, replacement, commercial/industrial, municipal, or livestock wells that pump  $\geq 50$  GPM. Permits are issued in accordance with the UENRD Groundwater Management Plan Rules and Regulations.

**FLOWMETER DATA**

Since October 2010, flowmeters have been required on all new wells (new, helper, expansion, transfer, or replacement) permitted in the UENRD which pump  $\geq 50$  GPM. Designated flowmeters are checked annually by UENRD staff. Flowmeter data is analyzed within UENRD Subdistricts, see map below.



Average inches pumped per year and the 10 year average (2011 – 2020) inches pumped are below:

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	AVG
<b>NW Holt &amp; Rock</b>	16.51	21.75	15.62	12.90	12.89	14.68	14.64	9.19	6.59	11.56	<b>13.63</b>
<b>SW Holt &amp; Rock</b>	22.48	17.32	9.53	4.53	6.55	9.53	11.17	9.55	4.17	10.35	<b>10.52</b>
<b>Eastern Holt &amp; Wheeler</b>	15.48	21.29	16.05	12.72	10.95	12.49	13.93	7.46	7.32	13.99	<b>13.17</b>
<b>Northern Antelope</b>	12.79	17.76	10.94	5.95	9.25	10.70	11.44	5.02	7.67	10.53	<b>10.21</b>
<b>Central Antelope</b>	10.10	14.42	11.39	5.77	6.73	8.38	8.65	3.92	4.87	10.02	<b>8.43</b>
<b>Southern Antelope</b>	10.88	23.51	15.39	8.92	8.10	9.35	11.84	6.14	7.01	6.35	<b>10.75</b>

### **WATER BANKING ACTIVITIES**

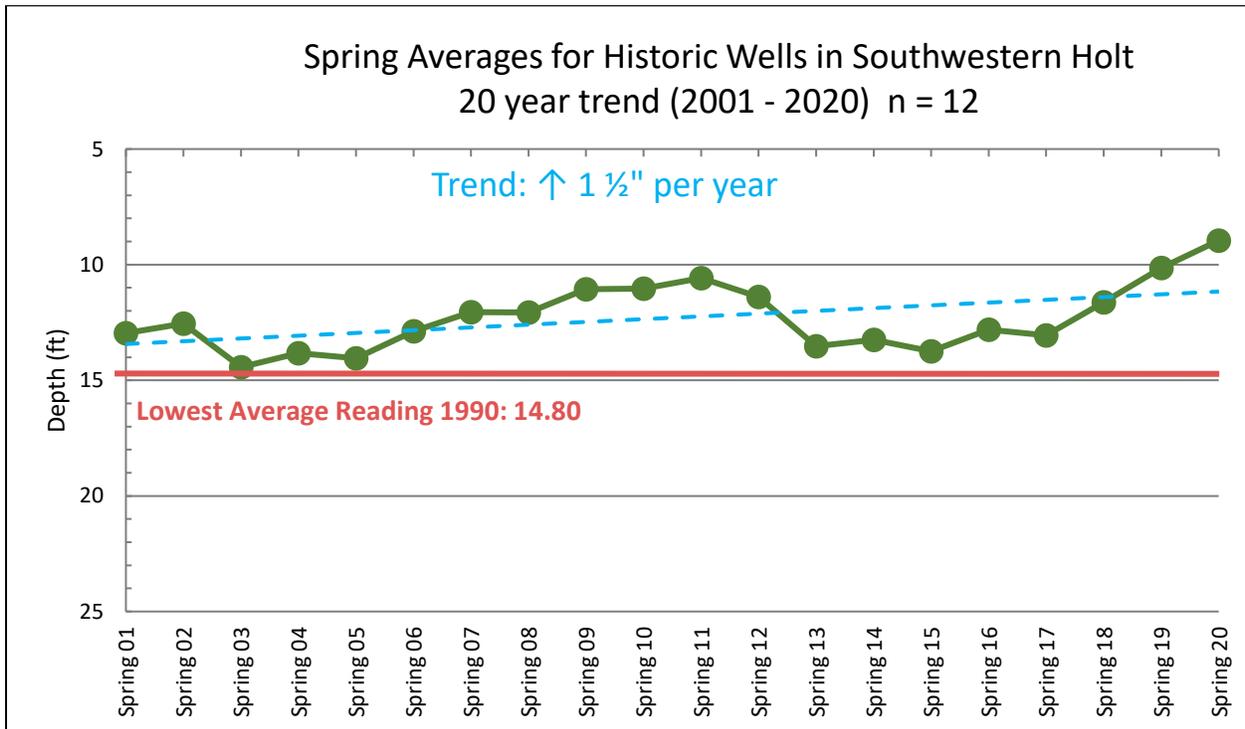
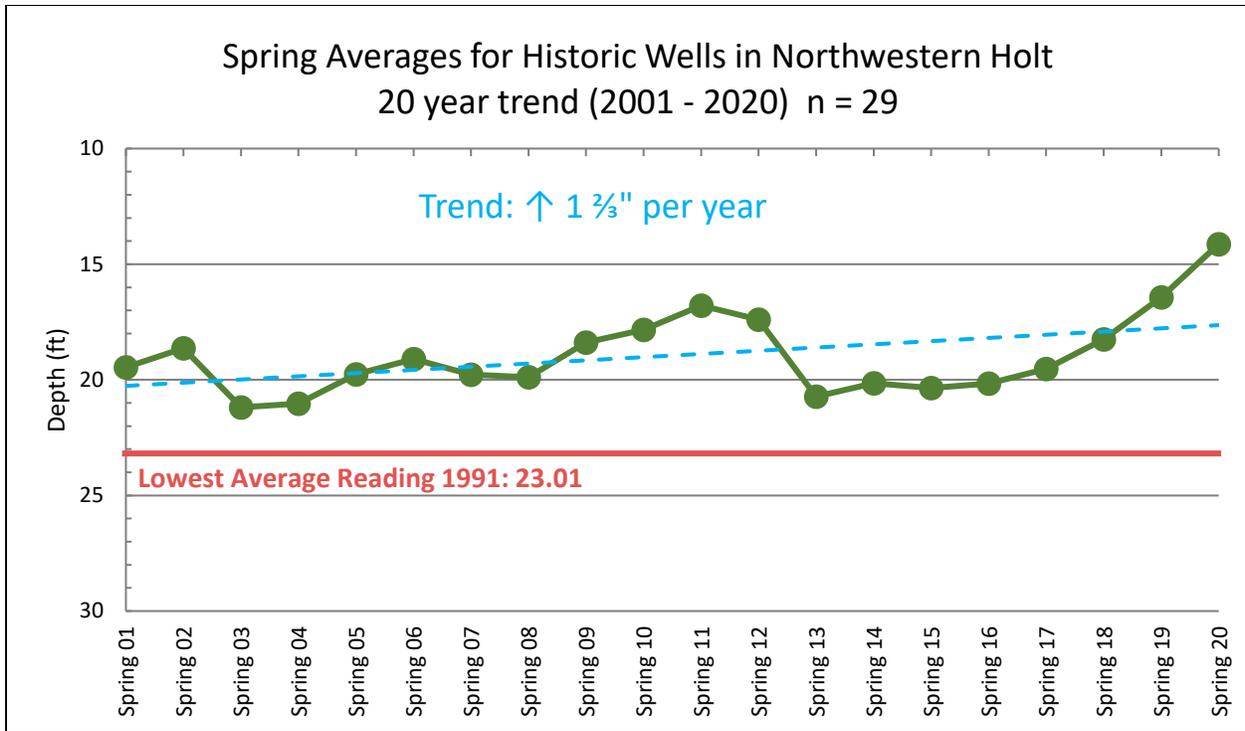
UENRD performed no formal water banking activities between 01/01/2020 and 12/31/2020. However, in conjunction with our Acre Certification, UENRD is certifying historically groundwater irrigated acres at 95% should the landowner decide to reactivate a field for irrigation purposes, and “banking” the 5% (see “CERTIFIED IRRIGATED ACRES” on Pages 3-4). UENRD is still in the processes of completing acre certification. Currently, UENRD has 479,757.8 certified groundwater irrigated acres, of which 40,959 are historic groundwater irrigated acres. Of those 40,959, 95% are certified as historical groundwater irrigated acres (38,906.144 acres), and 5% are banked acres (2,047.95 acres; see below). UENRD has not determined the future management implications or uses of the 5% of historical groundwater irrigated acres which have been banked, but they may be used to offset new groundwater uses in the future.

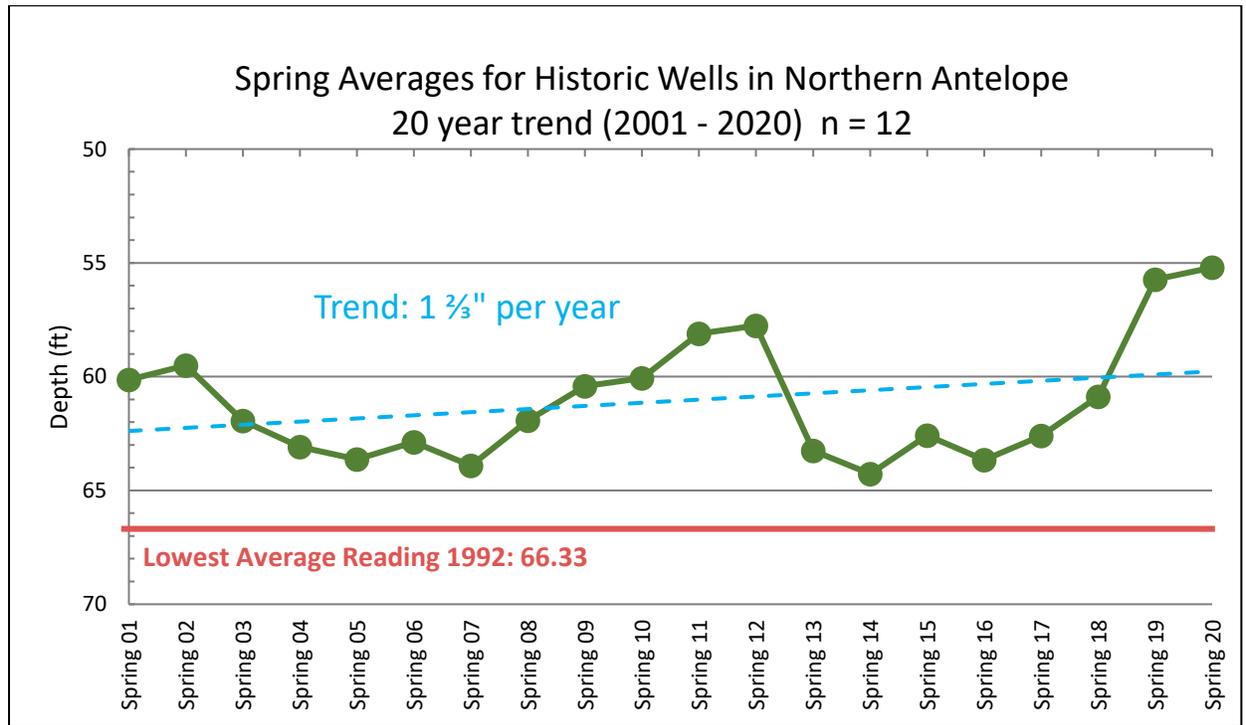
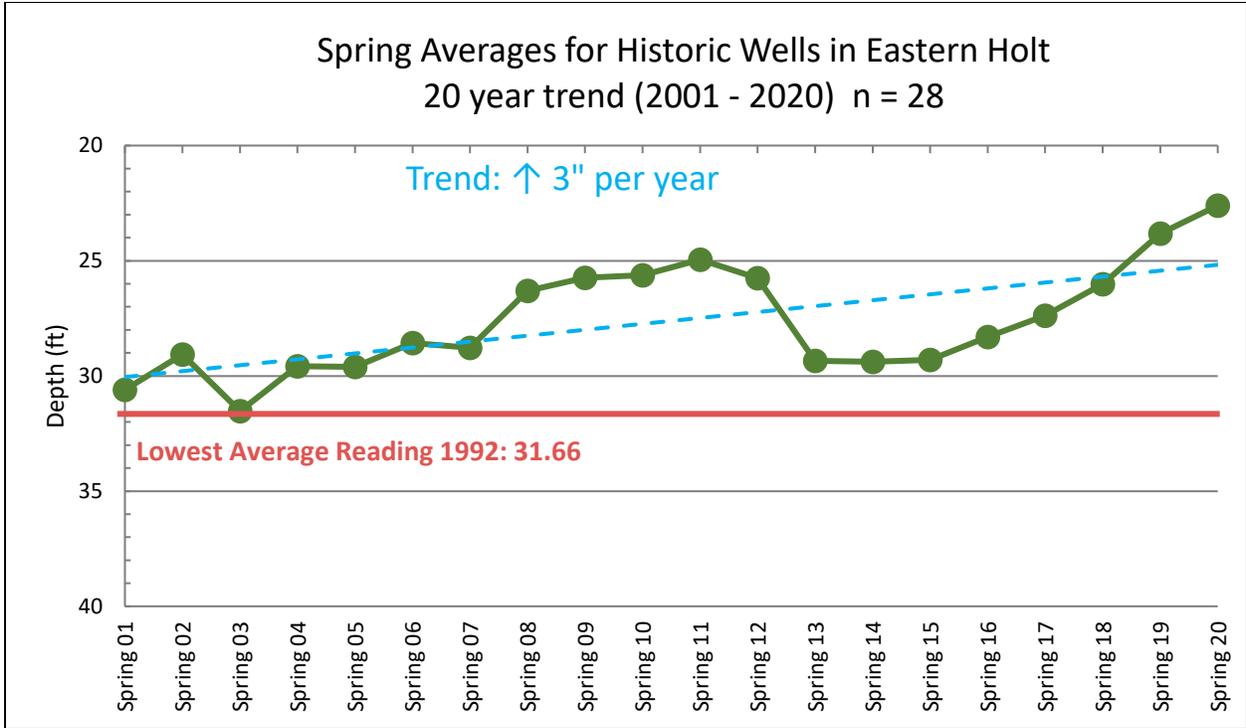
- 40,959 historic acres x 95% = 38,906.144 certified historical acres
- 40,959 historic acres x 5% = 2,047.95 banked acres (as of 01/28/2021)

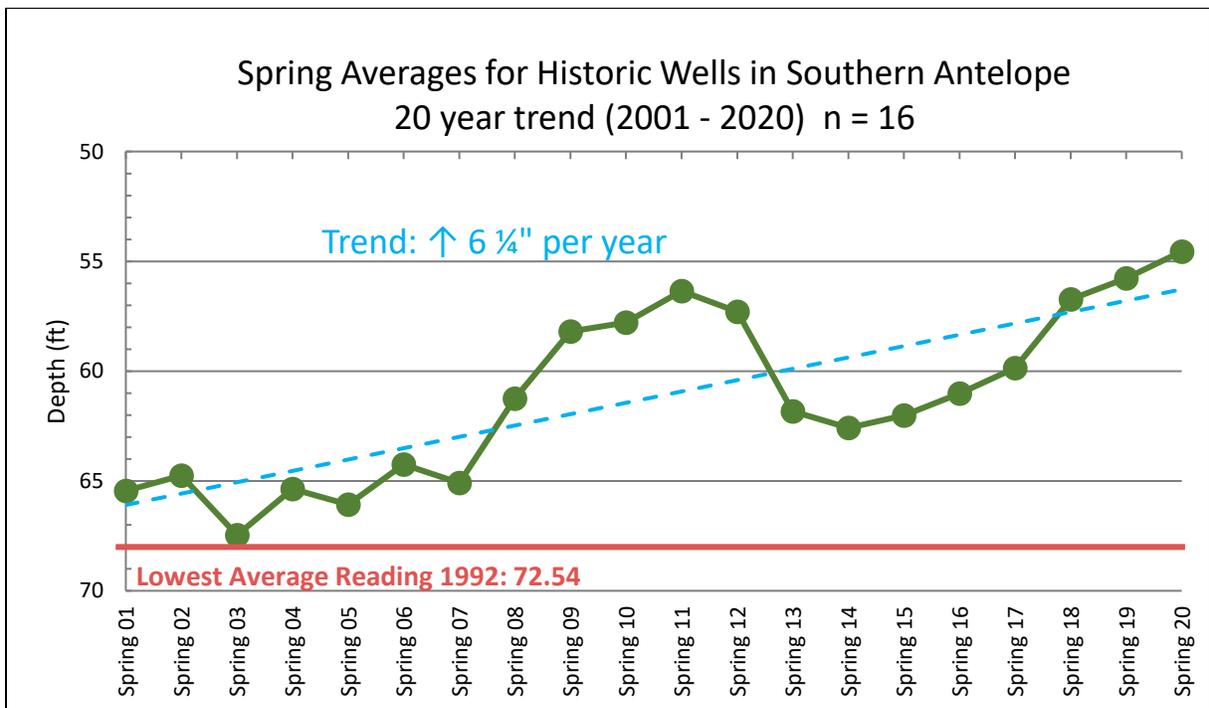
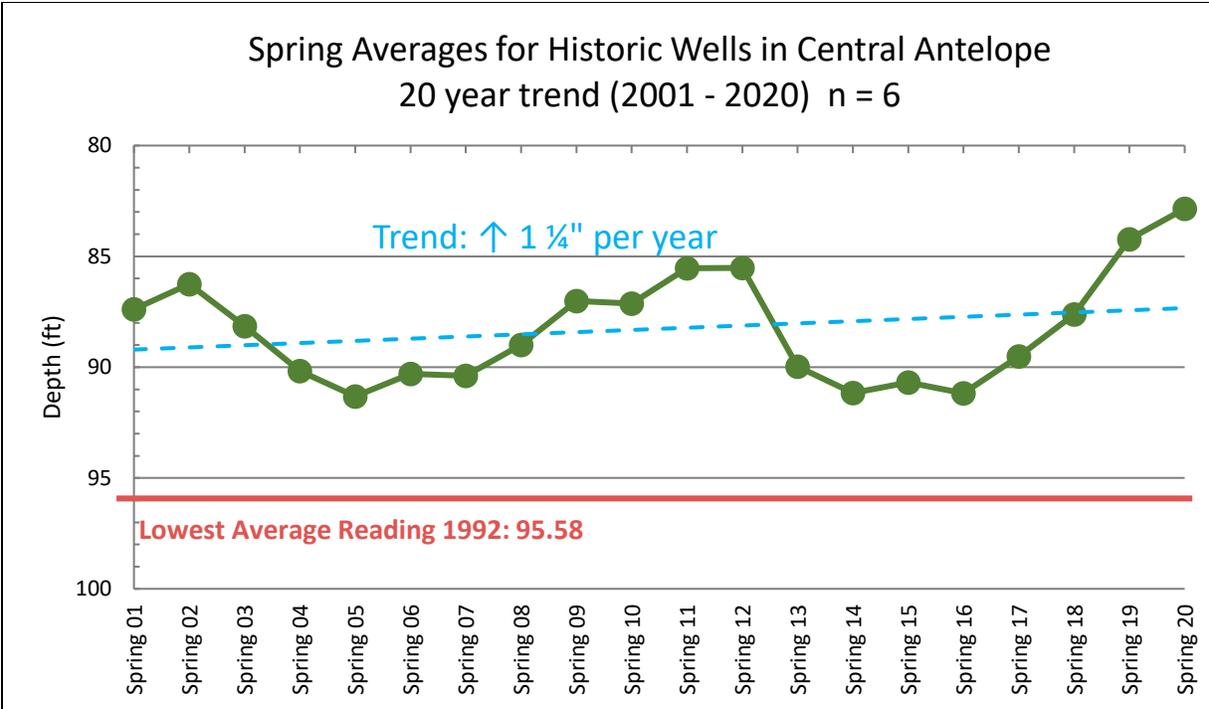
### **GROUNDWATER ELEVATION DATA**

The UENRD has maintained a static groundwater level monitoring program since 1975. This program has expanded to include 358 wells: 104 long-term historical irrigation wells, 62 District monitoring wells, and 199 new irrigation wells added in 2015. Depth to groundwater readings are collected every spring and fall and the data is used by the District to recognize changes in groundwater levels over time and better interpret the status of the aquifer. Static water levels and trends are analyzed by UENRD subdistricts. See map on Page 6 for UENRD subdistricts.

Only spring readings from historic irrigation wells are used to manage groundwater levels in UENRD. In general, the 20-year static groundwater level trendlines show that all 6 subdistricts (NW Holt & Rock, SW Holt & Rock, Eastern Holt & Wheeler, Northern Antelope, Central Antelope, and Southern Antelope) have increasing groundwater levels. Data from the past 20 years, as well as 20-year trendlines are provided by subdistrict in the following graphs:







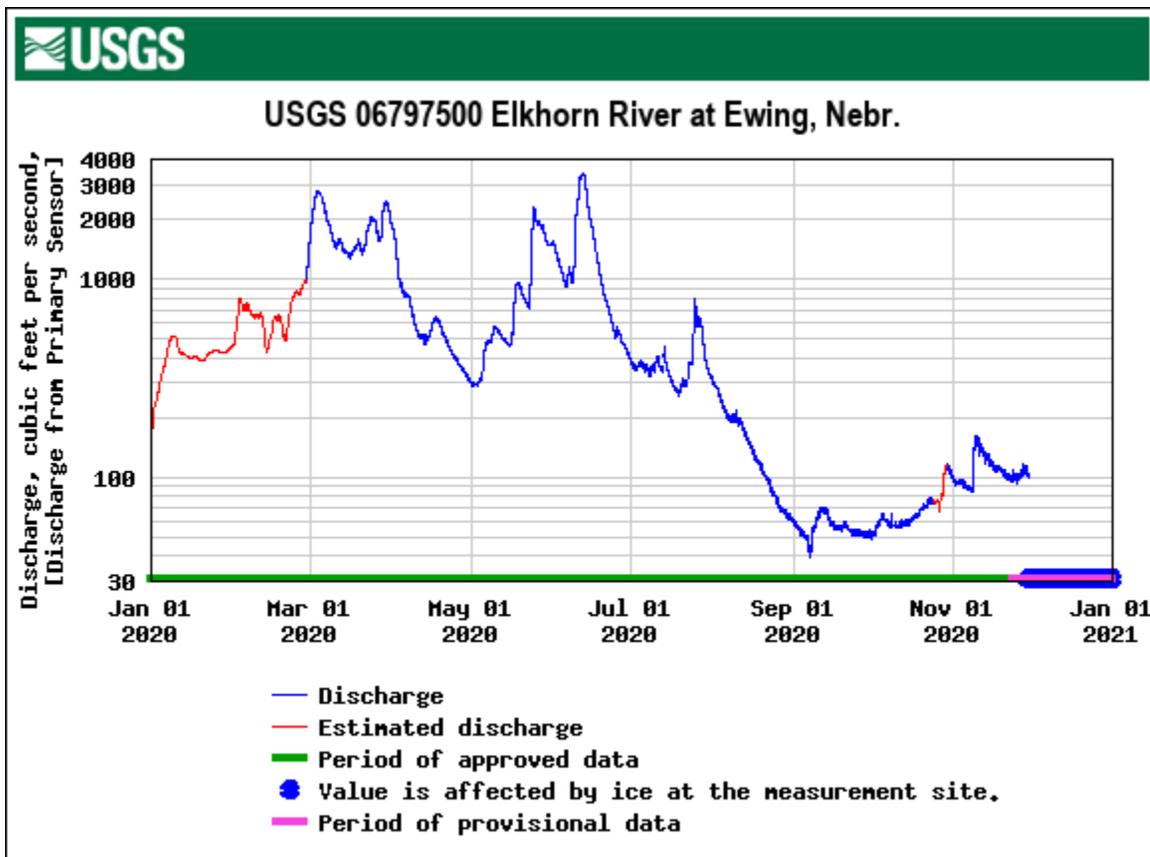
**STREAM FLOW ACCRETION ACTIVITIES**

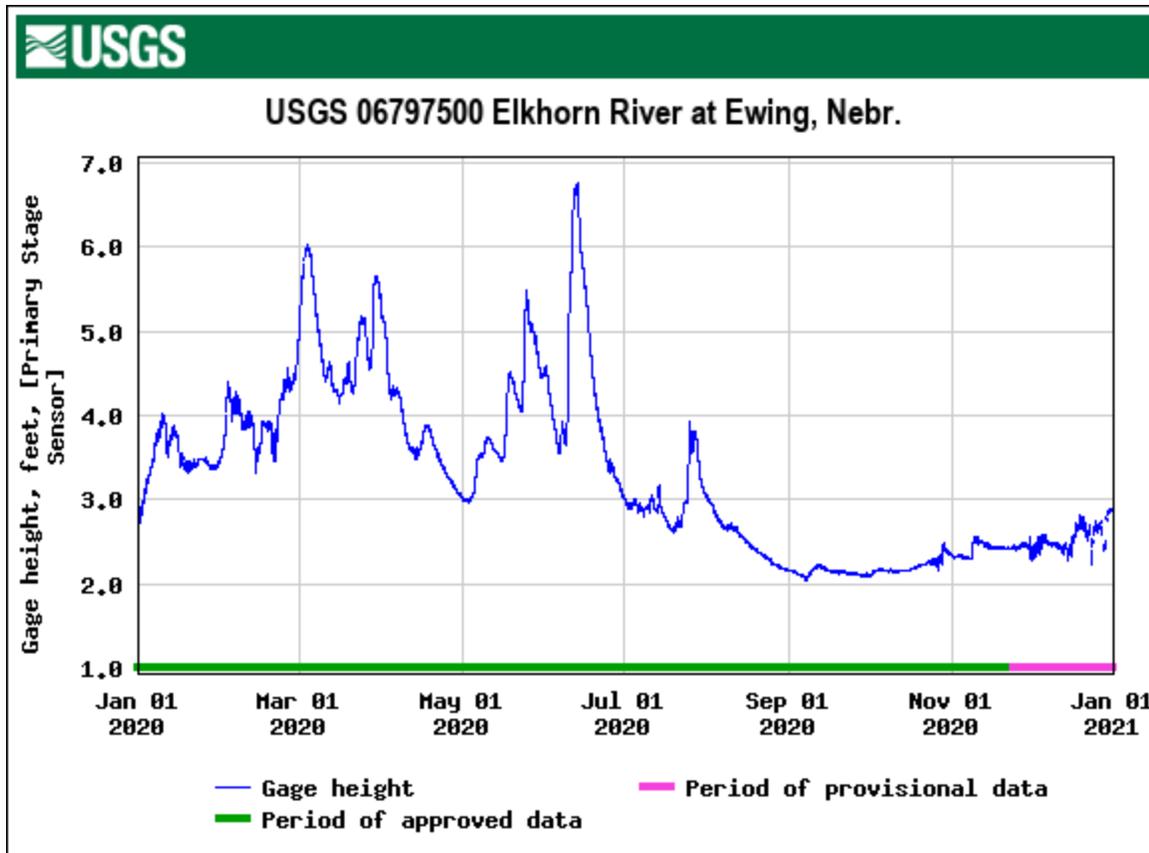
UENRD performed no stream flow accretion activities between 01/01/2020 and 12/31/2020.

**STREAM GAGE MEASUREMENTS**

UENRD provides funding for the USGS Gaging Station at Ewing, NE on the Elkhorn River. Below are 2 graphs showing the discharge in cubic feet per second from 01/01/2020 to 12/31/2020, as well as the gage height in feet.

Data from: <https://nwis.waterdata.usgs.gov/ne/nwis/current/?type=flow>.



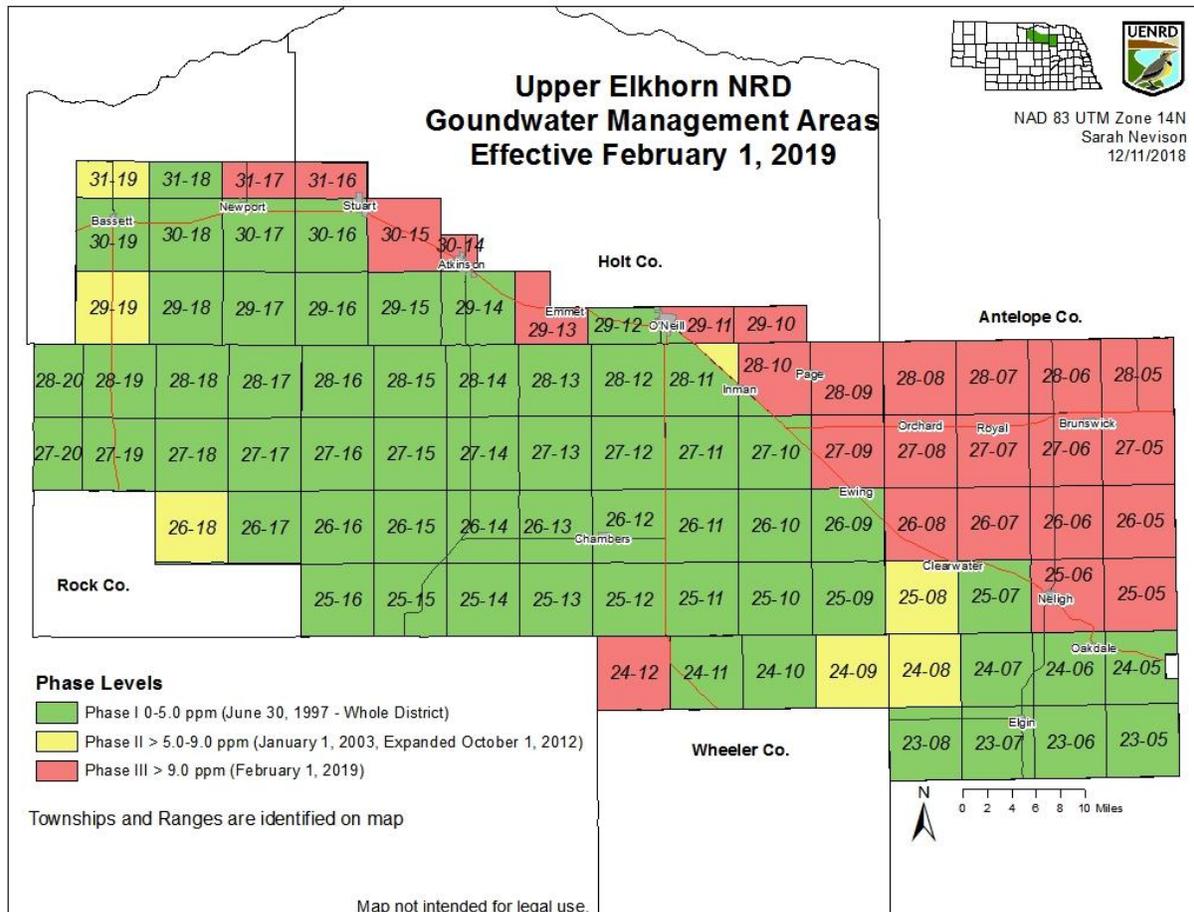


## NRD REGULATIONS/MANAGEMENT ACTIVITIES

- 1) UENRD has designated Groundwater Quality Management Areas, known as Phase I, Phase II, and Phase III, to address groundwater nitrate contamination throughout the District. Phase I, Phase II, and Phase III designations can be viewed on the map on page 13. Phase levels are designated by township nitrate averages from samples collected by UENRD. Phase I includes areas where the average groundwater concentration of nitrate-nitrogen is 0.0 – 5.0 ppm. Phase II includes areas where the average groundwater concentration of nitrate-nitrogen is > 5.0 – 9.0 ppm. Phase III includes areas where the average groundwater concentration of nitrate-nitrogen is > 9.0 ppm.
  - Phase I was initiated 06/30/1997 and encompasses the entire District. Phase I requires anyone who makes nitrogen application decisions (of more than 50 lbs of nitrogen per acre and on more than 1 acre) to be Nitrogen Certified through UENRD or a neighboring NRD every 4 years. Additionally, all irrigation water wells must be sampled every 4 years and the nitrate-nitrogen results submitted to UENRD.
  - Phase II was first designated on 01/01/2003 and encompassed the “Page Triangle” near Page, NE in Holt County, and Crawford Township in Antelope County. Additional Phase II Areas were designated on 10/01/2012 (see map). Phase II requirements include all Phase I requirements

and in addition require annual deep soil samples, Phase II Reporting Form submission, and Best Management Practices (BMPs) are strongly encouraged.

- Phase III was designated 02/01/2019. The Board of Directors approved the rules and regulations at the December 17, 2018 board meeting. Twenty-five whole or partial townships were designated as Phase III (see map). Phase I and II rules and regulations will remain in effect unless modified or negated by Phase III requirements. Phase III requirements include soil sampling to identify fields, which are larger than 40 acres with more than 50 lbs/ac of actual nitrogen applied, with high residual soil nitrate-nitrogen, and annual irrigation water samples.



### NEW DEPLETIONS ACCOUNTING REPORT

The Lower Platte River Basin Coalition Basinwide Water Management Plan has designated the first 5-year increment allowable development by Basin and by NRD. UENRD is allowed to develop (deplete) 1,504 acre-feet for the first 5-year period, 50% for surface water and 50% for groundwater. Below is UENRD’s accounting report of depletions (groundwater irrigated acre expansion for the 2017, 2018, 2019, 2020, & 2021 growing seasons) and the supplementation from transfers. Surface water depletion numbers are supplied by the Nebraska Department of Natural Resources (NeDNR).

- UENRD has approximately 1,198 acre-feet in allowable depletions to split between ground and surface water for the remaining year of the first 5-year increment.

A couple revisions were made to the depletions for the 2017 Acre Expansion, 2016 & 2017 Transfers, 2018 Transfers, and 2019 Acre Expansion. The 2017 Acre Expansion had included an expansion that was canceled. Excluding this expansion changed the depletion from 60.63 AF to 57.23 AF. The 2016 & 2017 Transfers included both portions of a transfer that went from outside the LPRB to inside. After adjusting, the change in depletion went from 0.95 AF to 0.14 AF. A change in the 2018 Transfers was corrected previously but the change was never reflected in the summary. The acre feet depletion changed from 3.17 AF to 0.12 AF. An 2019 Expansion number included a cancelled expansion. The exclusion of this expansion changed the depletion from 51.99 AF to 45.66 AF The layout of the table was adjusted to reflect how the allowable depletions are shared by UENRD and NeDNR.

		UENRD	NeDNR
<b>1,504.00</b>	<b>Starting Allowable Depletion</b>	752.00	752.00
2016 - 2017	2017 Acre Expansion	57.23*	
	2018 Acre Expansion	50.20	
	2016 & 2017 Transfers	0.14*	
			0.00
	Total	107.57	0.00
<b>1,396.43</b>	<b>Starting Allowable Depletion</b>	698.22	698.22
2018	2019 Acre Expansion	45.66*	
	2018 Transfers	-0.12*	
			0.00
	Total	45.54	0.00
<b>1,350.89</b>	<b>Starting Allowable Depletion</b>	675.45	675.45
2019	2020 Acre Expansion	26.32	
	2019 Transfers	-12.68	
			0.00
	Total	13.64	0.00
<b>1,337.25</b>	<b>Starting Allowable Depletion</b>	668.63	668.53
2020	2021 Acre Expansion	50.41	
	2020 Transfers	2.87	
	2020 Surface Water Permit		85.00
	Total	53.28	85.00
<b>1,198.97</b>	<b>Starting Allowable Depletion</b>	599.49	599.49

\*revised February 2021; corrections made for cancelled expansion and transfers not in LPRB.

**NEW DATA COLLECTED OR MODEL/STUDY RESULTS**

No new models or studies were conducted within UENRD which directly benefitted the Lower Platte River Basin Coalition. However, in July of 2016 aerial electromagnetic (AEM) surveys were flown and data was collected in the Bazile Groundwater Management Area, which covers Northern Antelope County in UENRD, and parts of Pierce and Knox Counties in Lower Elkhorn, Lewis and Clark, and Lower Niobrara NRDs. These surveys provided insight into the hydrogeology of the area, including 3D profiles, water storage capabilities, and recharge areas in the Bazile Groundwater Management Area. More information can be found at <https://www.enwra.org/coop.html>.

In June 2017, the UENRD Board of Directors voted to discontinue funding the Nebraska Mesonet weather stations in Newport, Brunswick, and Chambers, NE. These weather stations were maintained through the Nebraska State Climate Office at the University of Nebraska and provided data to local, state, regional, and national organizations. Stations in O'Neill and Elgin are still funded through Mesonet/UNL. UENRD no longer has ET data from the Newport, Brunswick, and Chambers stations.



**APPENDIX A – Municipal Water Use**

Municipality	1/1/20 - 12/31/20 Gallons Pumped	Per Capita Use (gals/person/day)	Population Served	2010 Census Data	2006 - 2015 Average Annual Gallons Pumped	Baseline Pumping Rate	Number of Wells
Atkinson	93,364,000	205.31	1245	1,245	98,922,370	218	3
Bassett	89,498,140	197.52	700	619	54,020,000	239	3
Chambers <sup>3</sup>				268	NA <sup>1</sup>	NA <sup>1</sup>	3
Clearwater	31,089,300	201.61	416	419	NA <sup>1</sup>	NA <sup>1</sup>	2
Elgin	57,881,000	220.10	720	661	NA <sup>2</sup>	NA <sup>2</sup>	2
Ewing	25,762,900	182.26	387	387	41,170,250	291	3
Neligh	82,987,500	133.65	1,700	1,599	NA <sup>1</sup>	NA <sup>1</sup>	4
Newport	5,132,000	175.63	80	97	NA <sup>1</sup>	NA <sup>1</sup>	2
Oakdale <sup>3</sup>					NA <sup>1</sup>	NA <sup>1</sup>	2
O'Neill	226,400,000	167.30	3,705	3,705	233,851,800	173	5
Page	4,230,300	69.77	166	166	NA <sup>1</sup>	NA <sup>1</sup>	2
Stuart	46,585,000	216.17	590	590	67,884,530	315	3

Per Capita Use was estimated using 01/01/2020 – 12/31/2020 gallons pumped, divided by the population served in that period, divided by 365.25 days (1 year). Baseline Pumping Rates was estimated using 2006 – 2015 (10 year) average annual gallons pumped, divided by the 2010 Census Data, divided by 365.25 days. All data provided by municipalities.

<sup>1</sup> Several municipalities are still working on getting previous years pumping data to UENRD: Chambers, Clearwater, Neligh, Newport, Oakdale, and Page.

<sup>2</sup> Elgin's data only went back to 2009, so an average annual baseline pumping rate (2006 – 2015) was unable to be calculated.

<sup>3</sup> 2020 pumping data not reported to UENRD when report submitted.

**APPENDIX B – Industrial/Livestock Water Use**

Well Registration #	Name	Legal			Use	GPM
		S	T	R		
G-136694	Agriliance LLC	2	24	6	C	100
G-092895	Antelope County Partners	2	25	5	S	100
G-086547		2	25	5	S	72
G-086548		2	25	5	S	72
G-186075		30	30	14	C	95
G-094434	Central Valley Ag Coop	12	23	5	C	90
G-073246		32	29	11	C	100
G-088467	Sargent Irrigation Company Inc	30	25	6	C	800
G-148010	Elkhorn River Holdings LLC	1	28	11	C	600
G-094916	Glen Larson	22	24	5	S	90
G-146271	Green Plains Atkinson LLC	25	29	12	C	600
G-143983		4	29	14	C	530
G-053742		4	29	14	C	800
G-174310	Sandhills Washout LLC	24	30	15	C	100
G-064726	Emme Ventures LLC	2	26	12	C	400
G-137716	Pentagon LLC	1	26	9	C	200
G-089661	Platte Center West LLC	15	26	10	S	100
G-123842		15	26	10	S	90
G-182536	Matt & Stacy Klabenes	20	26	7	S	300
G-046339	Nebraska Game & Parks Commission	26	25	11	C	1,250
G-097213	Niewohner Brothers Inc	8	23	7	S	300
G-071104	Olson Industries Inc	4	29	14	C	80
G-116635	Jon and Holly Young	17	29	17	S	100
G-112729	Rick Schindler	29	25	6	C	400
G-177969	Thiele Dairy	14	25	8	S	600
G-128917	Tinsley Grain	18	25	8	C	65

**APPENDIX C – 2021 Growing Season Acre Expansion**

Approved expansion groundwater irrigated acres for the 2021 growing season within the LPRB.

- 590.43 acres, 50.41 acre-feet depletion (see formula on Page 5)

Legal	Number of Acres	NIR (ft)	SDF %	% Depletion	Depletion Estimate (AF)
E1/2 NE 31-26-5	47	0.61	0.33	0.3	2.82
NE NE 20-25-5	5	0.60	0.60	0.3	0.54
NE NE 22-25-6	5	0.60	0.85	0.3	0.76
NW SW 22-25-5	5.53	0.60	0.60	0.3	0.60
E1/2 SW 28-24-5	45	0.59	0.55	0.3	4.39
SW 28-24-5	21	0.59	0.55	0.3	2.05
SW 35-24-5	129	0.59	0.51	0.3	11.63
SW 20-26-6	104	0.62	0.28	0.3	5.43
E1/2 NW 32-25-8	80	0.65	0.74	0.3	11.38
NW 29-26-6	134	0.62	0.38	0.3	9.46
SE 34-24-5	14.9	0.59	0.51	0.3	1.35
<b>TOTAL</b>	<b>590.43</b>				<b>50.41</b>

**APPENDIX D – Well Construction Permits**

UENRD well construction permits for groundwater wells within the LPRB between 01/01/2020 and 12/31/2020, over 50 GPM. Permits are issued in accordance with the UENRD Groundwater Management Plan Rules and Regulations.

UENRD Permit Number	Well Registration #	Name	Location	Number of Acres	GPM	Date Permit Approved	Classification Type
UE-20-001 <R>	G-054622	Rodney & Dianne Heiss	NE 8-27-9	130	750	1/22/2020	Replacement Well
UE-20-002	G-189545	Bonny J. San Hamel	SW 28-24-5	90	850	1/31/2020	New Well
UE-20-003 <R>	G-149432	Mission Farms Inc	SE 25-29-11	134.35	850	2/24/2020	Replacement Well
UE-20-005	G-189420	Dennis Dowd	SE 24-29-11	134.1	600	3/16/2020	New Well
UE-20-006 <R>	G-076395	Chris Moser	NE 23-25-8	185.89	900	3/18/2020	Replacement Well
UE-20-007 <R>	G-029472	Fredric & Debra Thiele	NE 18-26-7	133.94	600	6/10/2020	Replacement Well
UE-20-010 <R>	NA <sup>1</sup>	Elkhorn River Holdings LLC	SWNE 6-28-10	137.8		7/31/2020	Replacement Well
UE-20-011	NA <sup>2</sup>	Summerland Public Schools	SESE 4-26-8	0	150	8/14/2020	New Public Water Supply Well
UE-20-012 <R>	NA <sup>1</sup>	Farm Credit Services of America	NE 32-27-19	131		10/13/2020	Replacement Well
UE-20-013 <R>	NA <sup>1</sup>	Farm Credit Services of America	SW 32-27-19	131		10/13/2020	Replacement Well
UE-20-014	NA <sup>1</sup>	Garet Schindler	NE 4-24-7	91.25		10/29/2020	New Well
UE-20-017	NA <sup>1</sup>	David C. Schrader	NE 29-26-6	75		12/7/2020	New Well
UE-20-018 <R>	NA <sup>1</sup>	Elizabeth Matschullat	NW 36-29-10	150.35		12/9/2020	Replacement Well
UE-20-019	NA <sup>1</sup>	CDM Farms LLC	SW 35-24-5	129		12/10/2020	New Well

<sup>1</sup> As of report completion date, wells had not been completed & well registration number not assigned.

<sup>2</sup> Public Water Supply, data not made public.